

have also been made by Beyerinck,⁶ who inoculated young leaves of *Salix purpurea* with the contents of the vesicle of *Nematus viminalis*, but without being able to produce the corresponding nematus-gall. One result was gained, however, which also confirms the correctness of Beyerinck's observations, viz., that neither the puncture itself nor the irritation which it causes to the plant is the real cause of the development of the gall, but that the larva of the animal or the fungus spore is the factor which produces the gall. It is, therefore, not difficult to prevent the development of a gall, and this can be done by killing the larva before the gall has reached its full size.

The author gives the history of the development of a number of galls from various species of wild roses, oaks, etc., and a systematic classification of the galls. This classification depends upon whether the galls are free or immersed in the plant; whether they contain one or more embryos; and according to the host, whether this belongs to the angiosperms, the conifers or the ferns. The occurrence of tannin in the galls is discussed at length, and there are many other points of interest in the work, so that it forms a welcome contribution to the study of vegetable galls in general.—

THEO. HOLM.

The combined effects of geotropism and heliotropism.⁷

Dr. Czapek has recently obtained some valuable conclusions as to the interlocking effect of light and gravity stimuli. He finds that plants which are placed horizontally (for 60–70 minutes) until they have begun an upward geotropic curvature, when placed in an erect position and given a light stimulus on the previously lower side, will react to the light in exactly the same time as a control plant which has been standing upright meanwhile. On the other hand plants which were first given a heliotropic stimulus were greatly delayed in their reactions to a geotropic stimulus given later in an opposite direction. In the extension of the experiments plants were subjected to these two stimuli in every position from

⁶ Beyerinck, M. W.: Beobachtungen über die ersten Entwicklungsphasen einiger Cynipidengallen. Amsterdam 1882. Also: Ueber das Cecidium von *Nematus Capreae* auf *Salix amygdalina*. Bot. Zeit. 46: 1–11. 17–28. 1888.

⁷ F. Czapek, Ueber Zusammenwirken von Heliotropismus und Geotropismus. Aus d. Sitzungsber. d. kaiserl. Akademie d. Wiss. i. Wien. math.-naturw. Classe 41:—, Mr 1895.

vertically upright to a directly inverted, and it was found that the law of the "angle of incidence" of light does not hold when the light is given from below the horizontal. Further "that when an orthotropic organ is acted upon by two opposing stimuli, the resultant curvature will depend not only on the relative force of the stimuli but also on the position of the organ." The results of Dr. Czapek's work form an important addition to those which oppose the theory of "specific energy" of Johannes Müller which is upheld by Sachs and which forms the basis of Noll's speculations in his *Heterogene Induktion*. Incidentally, the prevalent views concerning plagiotropic organs are placed open to question.—D. T. MAC DOUGAL.